Commonwealth of Kentucky
Division for Air Quality

EXECUTIVE SUMMARY

PROPOSED
Title V, Operating
Permit: V-07-008
Air Products and Chemicals, Inc.
Catlettsburg, KY 41129
Date: August 28, 2007
Sukhendu K. Majumdar, Reviewer

SOURCE ID:	21-019-00117
SOURCE A.I. #:	83915
ACTIVITY ID:	APE20070001

SOURCE DESCRIPTION:

The hydrogen plant, which is owned and operated by Air Products and Chemicals, Inc., provides "over the fence" hydrogen and steam to the Catlettsburg Refinery. Construction and operation of the hydrogen plant was authorized by the Division for Air Quality in the permit VF-02-001, which was issued to Catlettsburg Refining, LLC. Since the hydrogen plant is owned and operated by Air Products and Chemicals, Inc., both the source and Catlettsburg Refining, LLC prefer that the hydrogen plant be issued a separate Title V permit.

The hydrogen plant, operated by Air Products, produces hydrogen using steam methane reforming technology to supply hydrogen and steam to the Marathon Petroleum Company's Catlettsburg petroleum refinery. Natural gas is the methane source. Natural gas process feed and recycled hydrogen product are compressed, and then directed to the hydrogenation and desulfurization beds, where hydrogenation and desulfurization occur to remove sulfur from natural gas to prevent poisoning of the reformer catalyst. The desulfurization beds contain zinc oxide catalyst to adsorb any sulfur compound to form zinc sulfide. When the catalyst becomes spent, it is removed and disposed of. Steam is mixed with the desulfurized gas and the mix is directed to the reformer.

The reformer contains catalyst filled tubes in which reactions occur. The mixed feed is converted into hydrogen and a mixture of carbon oxides. The syngas effluent from the reformer tubes is cooled and enters the high temperature shift reactor where any CO in the gas is converted to CO2 and additional hydrogen. The syngas out of the reactor is purified in the multi-vessel pressure swing adsorption unit where the impurities are adsorbed, allowing high purity hydrogen to pass through. The hydrogen plant uses a flare to burn excess hydrogen product during the refinery hydrogen demand curtailment and also to burn PSA feed gas (syngas), PSA purge gas, hydrogen product, natural gas, and relief valve vents from the hydrogen plant during the startup, shutdowns, process upsets, malfunction, maintenance and emergencies.

Following are the five (5) emission points in the hydrogen plant.

Emission Point, EP-01: Reformer Flue Gas Stack
Emission Point, EP-02: Condensate Stripper Vent
Emission Point, EP-03: Flare
Emission Point, EP-04: Plant Wide Fugitive emissions
Emission Point, EP-05: Plant Wide intermittent and continuous steam vents

SINGLE SOURCE DETERMINATION:

The hydrogen plant, operated by Air Products, produces hydrogen using steam methane reforming technology to supply hydrogen and steam only to the Marathon Petroleum Company's Catlettsburg petroleum refinery. Marathon Petroleum Company's Catlettsburg refinery is a PSD major source for regulated pollutants. Air Products' hydrogen plant is within the property limit of Marathon's refinery. Together they are considered by the Kentucky Division for Air Quality to be a single "major source" as defined in 401 KAR 52:001, Section (1)(45)(b), definition of major source for regulated air pollutants other than HAPS. Each owner/operator is responsible and liable for their own violations unless there is a joint cause for the violations.

PUBLIC AND AFFECTED STATE REVIEW:

The affected states (Ohio and West Virginia) were notified of the issuance of the draft permit on June 25, 2007, via e-mail. On July 2, 2007 the public notice on availability of the draft permit and supporting material for comments by persons affected by the plant was published in *The Ashland Independent*, Ashland, Kentucky. The public comment period expired 30 days from the date of publication.

Comments were received from Air Products and Chemicals, Inc., on July 31, 2007. Changes as necessary were made to the proposed permit as a result of the comments received, however the Division has concluded that the proposed operation will comply with all air quality regulations and requirements. Therefore, the Division has made a final determination to issue a proposed permit. The proposed permit will become final upon approval of the EPA.